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Letter dated 4 May 2017 from the Secretary-General addressed to the President of the Security Council

I have the honour to transmit to you herewith a communication, dated 2 May 2017, which I received from the Director General of the Organization for the Prohibition of Chemical Weapons (OPCW) (see annex). The letter transmits the report of the OPCW fact-finding mission in the Syrian Arab Republic regarding the incident of 16 September 2016, as reported in the note verbale of the Syrian Arab Republic, number 113, dated 29 November 2016.

I should be grateful if you would bring the present letter and its annex to the attention of the members of the Security Council.

(*Signed*) António **Guterres**

17-07534 (E) 120517

Please recycle

Annex

[Original: Arabic, Chinese, English, French, Russian and Spanish]

I have the honour to transmit to you my report entitled "Report of the OPCW Fact-Finding Mission in Syria regarding the incident of 16 September 2016, as reported in the note verbale of the Syrian Arab Republic, number 113, dated 29 November 2016" (see enclosure).

(*Signed*) Ahmet **Üzümcü**

Enclosure

[Original: Arabic, Chinese, English, French, Russian and Spanish]

NOTE BY THE TECHNICAL SECRETARIAT

REPORT OF THE OPCW FACT-FINDING MISSION IN SYRIA REGARDING THE INCIDENT OF 16 SEPTEMBER 2016 AS REPORTED IN THE NOTE VERBALE OF THE SYRIAN ARAB REPUBLIC NUMBER 113 DATED 29 NOVEMBER 2016

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1. EXECUTIVE SUMMARY

1.1 At its Forty-Eighth Meeting, the OPCW Executive Council (hereinafter "the Council") adopted a decision entitled "Reports of the OPCW Fact-Finding Mission in Syria" (EC-M-48/DEC.1, dated 4 February, 2015) in which, inter alia, it requested the Director-General to provide information on the progress of the Fact-Finding Mission (hereinafter "FFM") and specific plans, schedules, and their implementation to the Council at its next regular session. In response to that request, the Technical Secretariat (hereinafter "the Secretariat") submitted a Note to address the future activities of the FFM (S/1255/2015*, dated 10 March, 2015 and Add.1, dated 13 March 2015).

1.2 The Secretariat received Notes Verbales 109, dated 17 November 2016 and 113, dated 29 November 2016, from the Syrian Arab Republic, requesting actions by the FFM. Note Verbale 109 contained correspondence 259, dated 16 November 2016, which referred to a number of incidents reported to have occurred on the territory of the Syrian Arab Republic. Note Verbale 113 contained correspondence 9551, dated 29 November 2016, which referred to an incident in Um-Housh on 16 September 2016.

1.3 Correspondence 9551 further reported that in accordance with Paragraph 6 of Article X of the Chemical Weapons Convention (hereinafter "the Convention"), the Syrian Arab Republic had requested the Russian Federation to provide assistance in order to collect and transfer evidence in connection with the incident in Um-Housh on 16 September 2016. Furthermore, it proposed that the Secretariat organise the handover of the samples and material evidence in Damascus in the presence of official representatives of the Russian military.

1.4 These Notes Verbales form the basis of the deployment of the FFM from 11 to 19 December 2016 in regard to a number of incidents. However, this report only details the incident reported to have occurred in Um-Housh on 16 September 2016.

1.5 Following the receipt of the aforementioned Notes Verbales, the Director-General dispatched a team to collect the evidence pertinent to a number of alleged chemical incidents. The FFM deployed on two occasions—11 to 19 December 2016 and 6 to 12 January 2017—in order to gather facts and retrieve samples connected to the reported incidents. The team was composed of OPCW inspectors and interpreters. During these deployments, the FFM conducted interviews, collected testimonies, and reviewed documents and other information provided by the authorities of the Syrian Arab Republic. Furthermore, the FFM was able to visit the Syrian Scientific Studies and Research Centre (hereinafter "SSRC") in Barzi to conduct physical examinations of items related to the reported incidents and was able to secure and recover samples for analysis at OPCW and Designated Laboratories.

1.6 The prevailing narrative provided by the testimonies of the two casualties who were interviewed by the FFM and the information provided by the authorities of the Syrian Arab Republic and the Russian Federation described the events in Um-Housh during the period 15 and 16 September 2016. The narrative describes the use a number of projectiles, where two female casualties appeared to have been exposed to a toxic chemical substance. However, it appears that there was a considerable amount of time before access could be gained to interview any witnesses or other individuals connected to this incident or for any physical examination of the site that could be conducted by either of the abovementioned parties.

1.7 While the incident is reported to have occurred on 16 September 2016, the Russian Federation's Chemical, Biological, Radiological, and Nuclear Defence ("CBRN") Team was not able to visit the site or interview any witnesses until 16 November 2016, nor was it able to visit the house where the two casualties involved in the incident lived. The Technical Committee of the Authorities of the Syrian Arab Republic was not able to visit the site until 3 December 2016. While both the Russian Federation's CBRN Team and the Technical Committee of the Authorities of the Syrian Arab Republic have reported that a mortar was recovered from the site of the incident, the whereabouts of any potential weapon that may have caused injuries to the two casualties has not been established. Due to the prevailing security situation, the FFM was not able to visit the site.

1.8 However based on the interviews carried out, the documents reviewed, and the results of blood sample analyses, the FFM can confirm that the two female casualties reported to have been involved in the incident in Um-Housh, Aleppo of 16 September 2016 were exposed to sulfur mustard.

1.9 Furthermore, the FFM conducted a thorough technical weapon exploitation on a 217-mm calibre mortar that included a non-destructive evaluation and sampling of the contents at the SSRC in Barzi. Supported by the results of laboratory analysis, the FFM has determined that this mortar, which was handed over by the experts of the Russian Federation's CBRN Team to the authorities of the Syrian Arab Republic and reported to be connected to the described incident in Um-Housh on 16 September 2016, is a munition containing sulfur mustard.

2. FACT-FINDING MISSION BACKGROUND INFORMATION

2.1 The Secretariat received Notes Verbale 109, dated 17 November 2016, and Note Verbale 113, dated 29 November 2016 from the Syrian Arab Republic requesting actions by the FFM. Note Verbale 109 contained correspondence 259, dated 16 November 2016, which referred to a number of incidents reported to have occurred on the territory of the Syrian Arab Republic. Note Verbale 113 contained correspondence 9551, dated 29 November 2016 which referred to an incident in Um-Housh on 16 September 2016.

2.2 These Notes Verbales form the basis of the initial deployment of the FFM from 11 to 19 December 2016. However, this report only details the incident listed in Note Verbale 113, dated 29 November 2016 and containing correspondence 9551.

3. INITIAL DEPLOYMENT

3.1 The initial deployment comprised the Mission Team Leader, eight team members, and two qualified interpreters who conducted activities from 11 to 19 December 2016. The team met with the authorities of the Syrian Arab Republic to discuss the details of the deployment, and gathered information associated with the incident provided by the authorities of the Syrian Arab Republic. This included incident reports, medical records of casualties, names of the individuals affected, and treating hospital staff.

3.2 Additionally, the team was provided access to the SSRC in Barzi to inspect the unexploded munition, munition fragments, and environmental samples that were collected by the authorities of the Syrian Arab Republic and by the Russian Federation's CBRN team.

3.3 The composition of the team deployed from 11 to 19 December 2016 was as follows:

Team composition for initial deployment of the Fact-Finding Mission

No.	Function	Speciality
1.	Mission Team Leader	Inspection Team Leader
2.	Deputy Team Leader	Chemical Weapons Munitions Specialist
3.	Confidentiality Officer	Analytical Chemist Inspector
4.	Evidence Officer	Analytical Chemist Inspector
5.	Logistics Officer	Chemical Weapons Munitions Specialist
6.	Health & Safety Officer	Health & Safety Specialist Inspector
7.	NDE Specialist	Chemical Weapons Munitions Specialist
8.	NDE Specialist	Chemical Weapons Munitions Specialist
9.	Interpreter	N/A
10.	Interpreter	N/A

3.4 Over the course of the deployment, the team conducted two joint interviews with both of the casualties involved in the incident. Furthermore, the FFM was able to conduct technical exploitation of the unexploded munition and munition fragments and take and secure splits of environmental samples for further analysis by the OPCW at Designated Laboratories.

3.5 A full list of collected documents and samples can be found in Annex 2, Annex 5, and Annex 6.

4. SECOND DEPLOYMENT

4.1 The second deployment comprised the Mission Team Leader, the Confidentiality Officer, and one interpreter. The team deployed from 7 to 12 January 2017.

Team composition of the second deployment of the Fact-Finding Mission

No.	Function	Speciality
1.	Mission Team Leader	Inspection Team Leader
2.	Deputy Team Leader	Analytical Chemist Inspector
3.	Interpreter	N/A

4.2 Upon arrival, the team met with the authorities of the Syrian Arab Republic to discuss the mission plan for movements to the SSRC in Barzi to repackage and take custody of the previously secured samples. The FFM was provided with additional documentation related to the incident in Um-Housh on 16 September 2016. A full list of collected documents can be found in Annex 2.

5. DATA ANALYSIS

The Data Analysis Methodology Employed by the Fact-Finding Mission

5.1 The FFM inspectors conducted an analysis of the alleged incident, with a focus on identifying aspects related to the use of chemicals as a weapon. The analysis methodology used by the team to evaluate interviews and documents provided by the authorities of the Syrian Arab Republic is described in this report in paragraphs 5.10 to 5.13 under "Interview methodology and analysis", and paragraph 5.16 under "Analysis of information provided by the National Authority of the Syrian Arab Republic to the Fact-Finding Mission in the form of documents and services".

5.2 The analysis of general information provided to the FFM in the form of records, services, and testimonies collected by the team was carried out by FFM team personnel upon returning from the second deployment. The analysis of the medical information provided to the FFM and testimonies collected by the team was carried out by the medical personnel within the FFM. The data analysis and methodology for interviews employed by the FFM was consistent with OPCW standard operating procedures.

5.3 A technical exploitation was performed on the unexploded munition and fragments in SSRC in Barzi by the FFM. This technical exploitation included physical examination, X-ray imagery, chemical detection, sampling, and tagging of the items.

5.4 Environmental samples recovered by the Russian Federation's CBRN team from the location of the incident were handed over to a Technical Committee of the Authorities of the Syrian Arab Republic, which had been dispatched to Aleppo. The Technical Committee also conducted its own sampling activities in connection with the reported incident. The samples from both the Russian Federation's CBRN team and the Technical Committee were further transported to the SSRC in Barzi where the FFM team was allowed access to all of the samples.

5.5 The FFM was able to take and secure splits from samples provided by the Russian Federation's CBRN team and the Technical Committee for further analysis by the OPCW. All splits and joint samples were secured under OPCW seal whilst awaiting arrangements for transportation back to the OPCW Laboratory. The remainder of the original samples were left in the custody of the SSRC in Barzi.

5.6 During the second deployment, the split samples were transported and accompanied to the OPCW Laboratory by OPCW staff. Samples were analysed by the OPCW Laboratory and splits of neat agent samples were retrieved from the unexploded munition and analysed by two OPCW Designated Laboratories.

5.7 Blood samples were collected by local medical staff from the two casualties, whom the FFM interviewed in connection with the incident; the collection was witnessed by FFM team members. These samples were secured under OPCW seal and later transported to the OPCW Laboratory by FFM team members. The biomedical samples were analysed by two OPCW Designated Laboratories.

5.8 After the FFM returned from its second deployment, a video conference was conducted on 17 February 2017 with the Russian Federation's CBRN team in an effort to clarify technical points regarding their involvement and subsequent activities in connection with the reported incident.

5.9 All of the analyses specified in paragraphs 5.2 to 5.8 were performed in accordance with the FFM's mandate.

Interview methodology and analysis

5.10 The interview analysis methodology employed by the FFM allowed individual accounts to be collated into a prevailing narrative, where factual content could be extracted and reported according to the mandate. The various steps of this methodology are described in the paragraphs below.

5.11 First, the audio and video records of each interview conducted by the team were translated and transcribed into English by qualified interpreters in order to facilitate their thorough analysis.

5.12 Then, the verbal content of each interview (the video, audio, and transcripts thereof) was carefully reviewed by at least two FFM inspectors. A timeline-based analysis table was produced in order to organise the individual responses. This allowed each respondent's description of locations, sights, sounds, smells, and actions to be categorised according to relevant variables. During the interview review process, the FFM inspectors matched the interviewees' responses with their respective variables in the analysis table. The result for each interview was a unique description of an evolving, sequential event, from the perspective of both interviewees. Once all relevant narratives had been individually assembled, they were compared against one another to identify commonalities and discrepancies.

5.13 Commonalities formed the basis of the prevailing narrative, and discrepancies were analysed in order to determine their significance. Given that the interviewees were themselves casualties and that there were significant ongoing combat operations in the area, the FFM

anticipated reasonable discrepancies in the events recalled from the casualties. In cases where discrepancies were minor or of little consequence to establishing a prevailing narrative (i.e., the recollection of general timings and distances), they were disregarded. If reconciliation with the prevailing narrative was not possible, the discrepant narrative could be considered limited in value and therefore difficult to objectively address the FFM's mandate aims.

Analysis of the reported incident in Um-Housh on 16 September 2016

5.14 The prevailing narrative established by interviews with two female casualties in relation to the aforementioned incident is as follows:

(a) On "15 September 2016", or "a few days post Eid" as stated by the interviewees, a projectile landed on the house of a woman living in the village of Um-Housh. The woman described the sound of gas leaking and smoke coming out of a projectile, which appeared to be black metal, and approximately 40-cm long and shaped like a "rocket". There was ongoing fighting and the woman could not indicate the direction from which the projectile originated. The woman picked up the projectile and "placed it in the rubbish pile" in an effort to begin cleaning up her home from the debris and substance left from the munition. The whereabouts of the described projectile could not be determined.

(b) The woman provided a description of the inside of the house, stating that the walls looked like they had been "painted black with an engine oil type substance, with black spots all over and there was a very bad smell." She asked her neighbour to help her clean up the "mess". Both women used water, brushes, and cleaning detergent to clean; the black colour on the walls changed to a dark yellow colour after cleaning. The substance "did not come off easily, it was sticky and you had to apply force to wipe the black stuff from the walls".

(c) Approximately two hours after finishing cleaning the house, the homeowner started to feel dizzy and described that her voice and face "were different". She vomited that night and reported losing her vision for five days. Even though the neighbour who had helped clean took a shower and washed the clothing that she was wearing, she experienced similar symptoms during the same time-frame.

(d) On 16 September 2016, both casualties self-reported to the Tell Refaat Hospital, where they received basic treatment and were discharged on the same day. Upon discharge from Tell Refaat Hospital, they then self-reported to Afrine Hospital for further assessment of their injuries. They were then admitted to Afrine Hospital where they remained for five days with a reported altered state of consciousness.

(e) After five days in Afrine Hospital, both patients reported that their vision began to improve; however, symptoms associated with vision impairment lasted for approximately another 20 days. Both casualties' hands and arms were wrapped in bandages, which were covering blisters containing a yellowish-coloured liquid. Initially, the blisters "did not cause a significant amount of pain", but by the second day the pain was described by both casualties as "burning sensation on the hands, forearms, elbows, and feet" and "burning in the eyes". The leg of one of the patients

was swollen due to deep vein thrombosis (DVT) in the calf and she was unable to walk for ten days.

(f) Over the course of their treatment, both casualties visited or were admitted to a number of treatment facilities including: Tell Refaat Hospital, Afrine Hospital, and Kefrnaya Poly-clinic. The casualties were eventually transferred to Hospital 601 in Damascus for further treatment—this is also where both casualties were interviewed by the FFM.

Analysis of information provided by the National Authority of the Syrian Arab Republic to the Fact-Finding Mission in the form of documents and services

5.15 During the first deployment (11 to 19 December 2016) the FFM received a briefing pack from authorities of the Syrian Arab Republic including:

(a) A report of the incident in Um-Housh, which included Google Earth images showing the location of the reported incident;

(b) A hospital report from Afrine Hospital;

(c) Medical records for the two casualties from Hospital 601;

(d) An analysis report regarding some samples taken by the Technical Committee; and

(e) Three videos of interviews with two villagers and the Director of Afrine Hospital.

5.16 The report describes that the incident occurred on 15 September 2016 where several "locally made mortar shells of several calibres landed" on the village of Um-Housh, "15 km north of Aleppo City", with some failing to function as designed.

5.17 The Syrian Arab Republic requested the assistance of the Russian Federation "in order to validate the information" related to the incident.

5.18 "When the security situation improved", a Technical Committee of the Authorities of the Syrian Arab Republic, consisting of five individuals, was able to visit Um-Housh on 3 December 2016. The Committee interviewed doctors and patients connected to the incident, and was able to collect various samples from the alleged location of the incident (soil, wipe samples from munition fragments, and clothing samples from the casualties).

5.19 During its deployment, the FFM was shown the videos, which included an interview with a villager who indicated where another projectile had landed outside the wall of a dwelling inside the village of Um-Housh. The remnants of this projectile were, at the time of the film, still located just outside the wall of the dwelling. The Technical Committee collected and transported the remnants of this projectile to the SSRC in Barzi.

Review of the medical records and the assessment of patient injuries

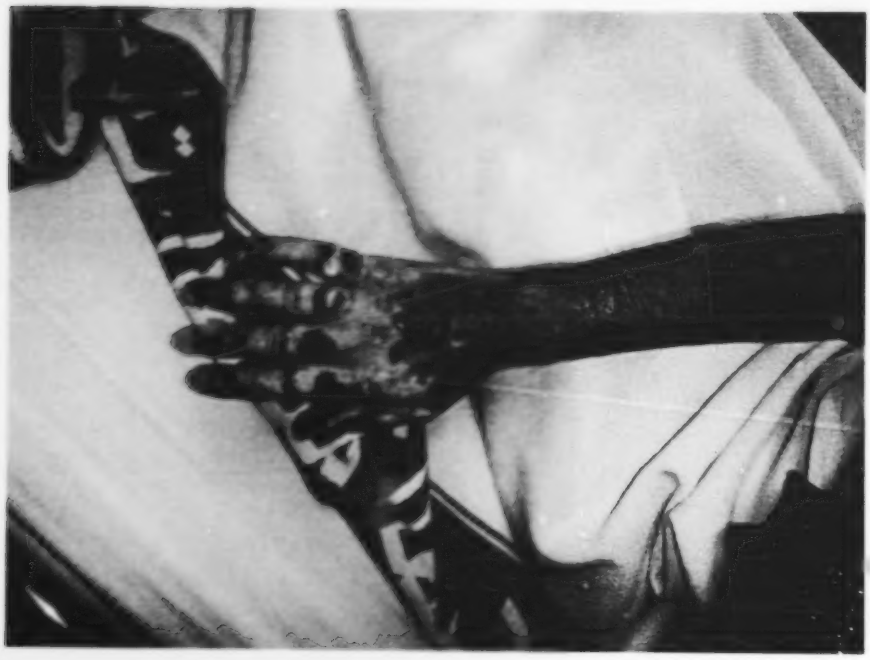
5.20 Following the review of medical records and witness testimonies regarding both casualties, it appears that both casualties experienced similar symptoms and treatment. Both casualties remained together during the entirety of the incident and treatment, as was the case when they

were interviewed by the FFM. The only significant difference in symptomology between the two casualties was the presentation of a DVT by one of the casualties. As indicated in the medical notes and records, it is assessed that this is likely due to lack of movement by the casualty at some point.

5.21 Early photos of the casualties' injuries show blisters on the arms, which are typical of sulfur mustard injuries.

Picture 1. Provided by authorities of the Syrian Arab Republic.

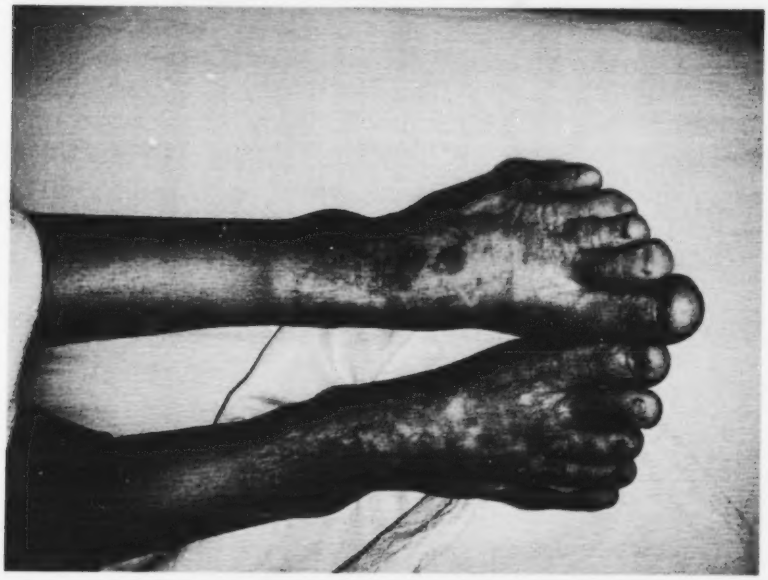
5.22 Photos taken by the FFM of the patients several months after the reported incident in Hospital 601 show both typical and atypical signs of exposure to sulfur mustard.



Picture 2. Photo of a hand of a female casualty taken by the FFM.

Picture 3. Photo of the upper arm of a female casualty taken by the FFM.

Picture 4. Photo of the upper arm of a female casualty taken by the FFM.



Picture 5. Photo of the feet of a female casualty taken by the FFM.

5.23 The photos of the feet, arms, and hands show vivid signs of discolouration patterns and injury. Hyper and hypo discolouration is generally only seen several months post incident, not within three to four months as is the case in these photographs. One possible explanation provided by medical staff at Hospital 601 is that this could be undiagnosed vitiligo.

5.24 Some of the scarring and epithelial proliferation (hypertrophic and keloid scars) may be the result of inadequate access to medical care, post injury. Some of these scars do appear similar to thermal burns; however, it is possibly due to inadequate treatment.

5.25 The casualties described losing vision with gradual restoration of sight and a burning sensation in the eyes, which is typical for sulfur mustard exposure; however, there was no indication of blepharitis, which is a common condition.

5.26 Both patients complained of some shortness of breath and tightness in the chest.

5.27 Overall, the history, presentation of the casualties, and subsequent treatment appears to be consistent with exposure to sulfur mustard.

Video recording of the Director of Afrine Hospital

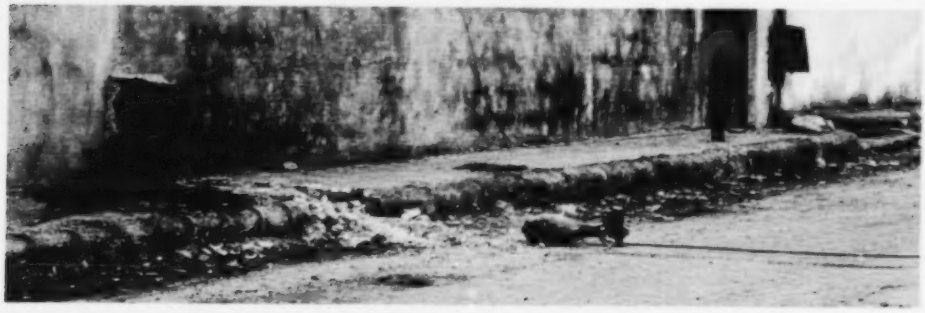
5.28 In a recorded interview with the Technical Committee of the Authorities of the Syrian Arab Republic, referring to the two casualties described above, the Medical Director of Afrine Hospital stated that both casualties had blisters on their faces, as well as the hands, feet and body and that they were in pain. His description is consistent with what was obtained from the casualties during interviews.

5.29 The Medical Director indicated that the Afrine Hospital Laboratory found evidence of "mustard gas" in blood and plasma samples taken from the patients. In response to this information, a team was tasked to collect soil and other samples from the patients' house. These environmental samples were transported to the SSRC in Barzi. However, the blood and plasma samples that were taken during the course of the patient's treatment appear to have been discarded.

Weapon recovery by the Russian Federation's CBRN Team

5.30 One unexploded projectile (mortar) is reported to have been recovered from Um-Housh by the Russian Federation's CBRN Team on 16 November 2016. The projectile was then handed over to authorities of the Syrian Arab Republic, who transported it to the SSRC in Barzi for storage.

Picture 6. Photo of the tail boom of the reported unexploded projectile prior to extraction from the ground (provided by the authorities of the Syrian Arab Republic).



Picture 7. Removal of the reported unexploded projectile. A visual assessment indicates that this is the projectile that was recovered by the Russian Federation's CBRN team and handed over to the authorities of the Syrian Arab Republic.

Picture 8. Sampling operations being conducted by the Russian Federation's CBRN team on the item that appears in Picture 7.

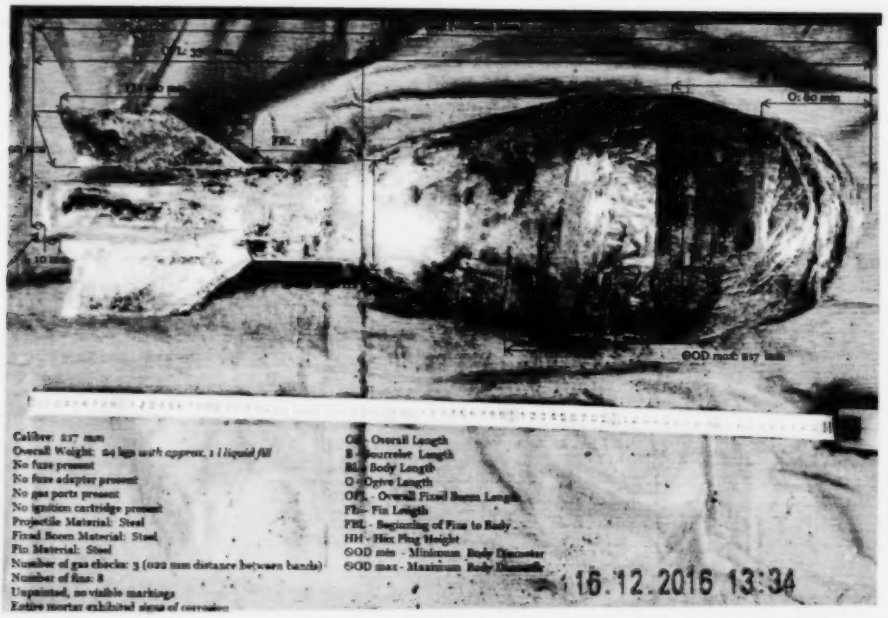
FFM technical weapon exploitation

5.31 On 16 December 2016, the FFM team was able to conduct a thorough technical weapon exploitation and was able to collect samples at SSRC in Barzi from the projectile that was handed over by the Russian Federation's CBRN team to the authorities of the Syrian Arab Republic.

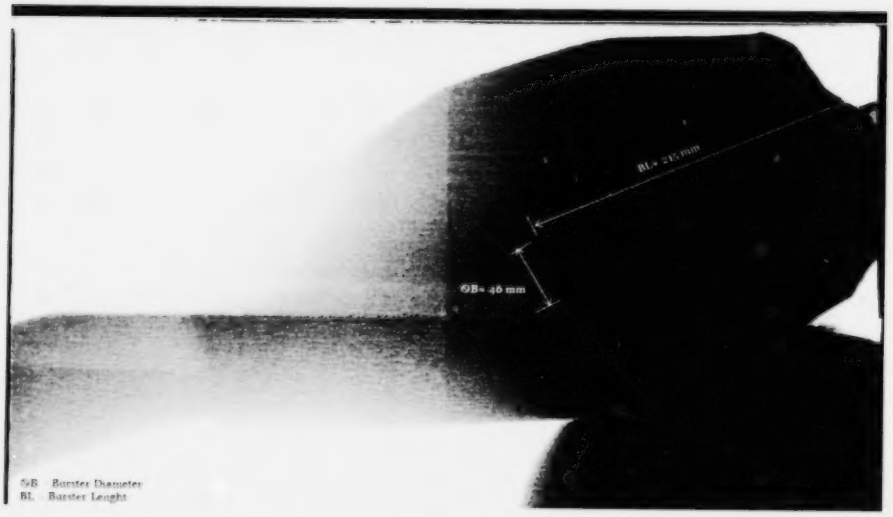
5.32 During the preliminary check of the projectile, an LCD 3.3 indicated the presence of mustard.

5.33 X-ray images taken by the FFM indicated a visible liquid line in the tail boom section of the projectile. It is estimated that there was approximately 1 L of liquid contained within the projectile.

5.34 Based on the results of the technical weapon exploitation, the FFM's initial assessment is that the projectile is a 217-mm calibre mortar with a liquid sulfur mustard fill.


Caliber: 81 mm
Overall Weight: 04 kgs with approx. 1 l liquid fill
No fuze present
No fuze adapter present
No gas ports present
No ignition cartridge present
Projectile Material: Steel
Fixed Boom Material: Steel
Fin Material: Steel
Number of gas checks: 3 (022 mm distance between bands)
Number of fins: 8
Unpainted, no visible markings
Entire mortar exhibited signs of corrosion
OL - Overall Length
B - Bourrelet Length
BL - Body Length
O - Ogive Length
OFL - Overall Fixed Boom Length
FL - Fin Length
FBL - Beginning of Fins to Body
HH - Hex Plug Height
ΘOD min - Minimum Body Diameter
ΘOD max - Maximum Body Diameter
16.12.2016 13:34

Picture 9. Photograph of the mortar with dimensions and description.



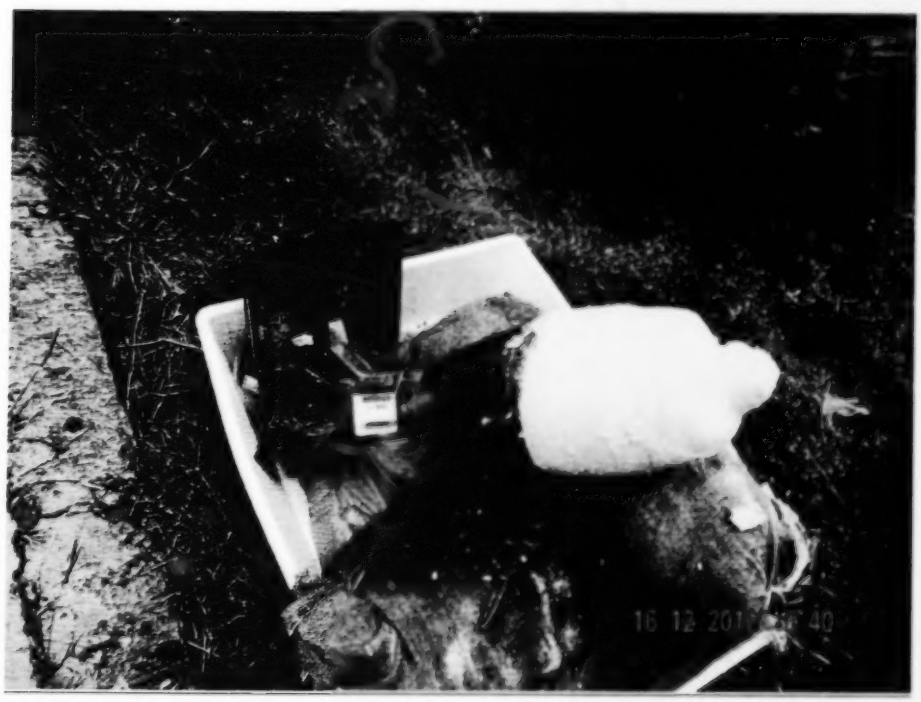
Picture 10. X-Ray image of the mortar indicating the liquid level and internal burster dimensions.

5.35 During the technical exploitation, a physical examination was conducted on a munition fragment collected by the Technical Committee; the fragment appears to be similar in structure to the unexploded mortar. It is assessed that this is the fragment found in the video described in paragraph 5.19. There was no indication that a chemical warfare agent was present.

Picture 11. Fragment of the mortar described in paragraphs 5.19 and 5.35.

5.36 At the end of the technical exploitation, the unexploded mortar and the munition fragment were tagged and repackaged. A short discussion ensued where the FFM Team Leader informed the authorities of the Syrian Arab Republic that the items were to be kept in storage whilst it was determined whether the items would be subject to systematic verification in accordance with Part IV (A), paragraphs 41 to 43 of the Verification Annex to the Convention.

Picture 12. Fragment of the mortar with the tag applied by the FFM.



Picture 13. 217-mm calibre mortar with the tag applied by the FFM.

5.37 The full Technical Weapons Exploitation Report can be found in Annex 9.

Environmental sampling and analysis

5.38 A number of samples that were secured by the FFM were reported to have been recovered from Um-Housh by the Russian Federation's CBRN Team on 16 November 2016. These samples were subsequently handed over to the authorities of the Syrian Arab Republic and were stored in the SSRC in Barzi in a secured fume hood.

5.39 The Technical Committee of the Authorities of the Syrian Arab Republic informed the FFM that they had also visited the location of the incident in order to conduct sampling activities. Samples taken by the Technical Committee were then transported to the SSRC in Barzi for further analysis.

5.40 The FFM team was given access to all samples in the custody of the authorities of the Syrian Arab Republic on 16 December 2016. The FFM team was provided the opportunity to conduct technical weapon exploitation and sample recovery activities on-site, where they were able to take splits of samples for further analysis by the OPCW.

5.41 Upon completion of sampling activities by the FFM, all splits, joint samples, and original samples were secured under OPCW seal. The authorities of the Syrian Arab Republic were informed that the splits would be collected at a later date for transport to the OPCW Laboratory.

5.42 On 10 January 2017, the split samples were recovered and packed by the FFM team for movement, first by road to Beirut, and subsequently by air and road to the OPCW laboratory.

5.43 Upon the arrival of the samples at the OPCW Laboratory, the samples were handed over to the Head of the Laboratory; the handover was witnessed by the FFM Team Leader and representatives of the authorities of the Syrian Arab Republic. All transfers of samples were documented and verified according to standard OPCW procedures.

5.44 The samples were analysed by the OPCW Laboratory. Additionally, neat agent samples were analysed by two OPCW Designated Laboratories. The laboratory reports from the Designated Laboratories indicated the presence of sulfur mustard in the neat agent samples. The OPCW Laboratory conducted a full screening of samples where sulfur mustard, its by-products, and degradation products were identified.

5.45 The OPCW Laboratory report indicated the presence and the relative quantities of disulfide and trisulfide mustard analogs. The presence of a number of chlorinated species indicates that an excess of sulfur monochloride (S_2Cl_2) was used. It is assessed that this sulfur mustard was most likely produced using the Levinstein process. The full laboratory report can be found in Annex 11.

Biomedical sampling and analysis

5.46 During the interview of both casualties, it was agreed that blood samples would be collected for analysis by OPCW Designated Laboratories. The blood samples were collected by the

medical staff of Hospital 601, and that process was witnessed by two FFM team members. Both casualties agreed to and signed the bio-medical consent forms prior to the collection.

5.47 All collected samples were immediately handed over to the FFM team members and transported for further processing, storage, and transport. On 18 December 2016, the blood samples were packed according to the requirements for bio-medical sample transportation and were hand-carried back to the OPCW Laboratories accompanied by two assigned FFM team members.

5.48 On 19 December 2016, the samples were handed over to the OPCW Laboratory in the presence of the Head of the Laboratory and the FFM Team Leader. All transfers of samples were documented and verified according to standard OPCW procedures.

5.49 The biomedical samples were sent to two OPCW Designated Laboratories for further analysis. The laboratory reports indicated the presence of biomarkers of sulfur mustard exposure. The full bio-medical laboratory report can be found in Annex 10.

Analysis of information provided by the Russian Federation to the authorities of the Syrian Arab Republic, which was subsequently handed over to the Fact-Finding Mission in the form of documents and services

5.50 Note Verbale 113 contained correspondence 9551, dated 29 November 2016, which referred to the incident in Um-Housh on 16 September 2016. In accordance with Paragraph 6 of Article X of the Convention, the authorities of the Syrian Arab Republic requested the Russian Federation to provide assistance in order to collect and transfer evidence in connection with this incident.

5.51 During the initial deployment of the FFM from 11 to 19 December 2016, the authorities of the Syrian Arab Republic handed over a written report describing the activities carried out by the Russian Federation's CBRN team. This report contained:

(a) A CD showing the sampling conducted in the village of Um-Housh;

(b) A CD showing the hand-over of samples by the Russian experts to the authorities of the Syrian Arab Republic;

(c) Russian laboratory test results;

(d) A report from Afrine Hospital; and

(e) Images of the two casualties.

5.52 This report, written by the authorities of the Syrian Arab Republic, states that on 16 of November 2016, the Russian Federation's CBRN team visited the location of the incident in Um-Housh and conducted sampling activities in connection with the targeted home and an "unexploded locally manufactured mortar". During a preliminary screening with a portable infrared spectrometer, the presence of "Yperite" (sulfur mustard) was indicated. The Russian Federation's CBRN team was able to visit Afrine Hospital, where it met with treating medical staff and was able to interview the two casualties.

5.53 The Russian experts sent the samples they had collected from the location of the incident for analysis at an accredited laboratory in the Russian Federation. The results from this laboratory confirmed the presence of "mustard gas".

5.54 A full list of documents provided to the authorities of the Syrian Arab Republic by the Russian Federation can be found in Annex 2.

Video conference conducted with the Russian Federation CBRN team on 17 February 2017

5.55 Following an exchange of emails between the FFM Team Leader and representatives of the Russian Federation in early February 2017, a video conference was arranged in order to clarify and confirm the activities of the Russian Federation CBRN team in connection with the incident.

5.56 The video conference took place on 17 February 2017 between the FFM team and members of the Russian Federation's CBRN team. During the course of the video conference, it was established that the Russian Federation's CBRN team was dispatched to Um-Housh on 16 November 2016. The narrative established during the course of the video conference is as follows:

(a) The CBRN team was able to recover the unexploded mortar and retrieve samples from it and the surrounding area. However, due to the prevailing security situation at the time, the CBRN team could not visit the house where two female casualties were reported to have obtained their injuries. Nevertheless, they were able to interview one of the casualties in a location nearby.

(b) According to the Russian Federation's CBRN Team Leader, the casualty reported that the village of Um-Housh was exposed to an attack with the use of chemical munitions, and that one of the munitions hit the building where she lived. After the attack, "there was a strong smell of garlic" in the house and "the walls and the floor were covered with a yellowish oily residue". After doing housework, she and her female friend felt bad and were taken to Afrine Hospital.

(c) The Russian Federation's CBRN team was able to visit Afrine Hospital on 20 November 2016. During the course of that visit, they received medical records and written testimonies from personnel who treated the casualties.

(d) The Russian Federation's CBRN Team Leader described how the samples were packed in hermetic containers and then sealed. The samples were stored in a special sealed room at the Reconciliation Centre in Aleppo. Four sets of samples were prepared, of which one set was sent to the Russian Federation for off-site analysis; the remainder appear to have been handed over to representatives of the authorities of the Syrian Arab Republic.

(e) The Russian Federation's CBRN Team Leader stated that he had prepared a written report for his commander. During the course of the video conference, the FFM Team Leader requested access to the Russian Federation's CBRN team report and the full analysis report from the Russian Federation laboratory. This request was subsequently

transmitted to the authorities of the Russian Federation via Note Verbale NV/INS/208648/17, dated 23 February 2017. *(At the time of the drafting of this report, the FFM has yet to receive the CBRN Team report).*

Review of the laboratory report submitted to the FFM on 30 March 2017.

5.57 On 30 March 2017, the FFM was provided with a document entitled 'Data of sand and liquid samples analysis updated into OPCW Proficiency Testing format'. This report provided information related to the incident in Um-Housh. Two samples were analysed: a sand sample collected from what is described as the blast area in Um-Housh, and black liquid collected from a munition reported to have been found in Um-Housh. The samples were analysed using gas chromatography with mass spectrometry (in electron ionisation mode) and gas chromatography with tandem mass spectrometry (in chemical ionisation mode). The analysis of both samples indicated the presence of sulfur mustard.

5.58 A full list of documents provided by the Russian Federation can be found in Annex 3 and Annex 4.

6. CONCLUSIONS

6.1 The prevailing narrative provided by the testimonies of two casualties who were interviewed by the FFM and the information provided by the authorities of the Syrian Arab Republic and the Russian Federation described the events in Um-Housh on 15 and 16 September 2016. The narrative describes the use of a number of projectiles, via which two female casualties appeared to have been exposed to a toxic chemical substance.

6.2 While the incident is reported to have occurred on 16 September 2016, the Russian Federation's CBRN Team was not able to visit the site or interview witnesses until 16 November 2016, nor was it able to visit the house where the two casualties lived. The Technical Committee of the Authorities of the Syrian Arab Republic was not able to visit the site until 3 December 2016. While both the Russian Federation's CBRN Team and the Technical Committee of the Authorities of the Syrian Arab Republic have reported that a mortar was recovered from the site of the incident, the whereabouts of any potential weapon that may have caused injuries to the two casualties has not been established. Further, due to the prevailing security situation, the FFM was not able to visit the site.

6.3 However, based on the interviews carried out, the documents reviewed, and the results of blood sample analyses, the FFM can confirm that the two female casualties reported to have been involved in the incident in Um-Housh, Aleppo of 16 September 2016 were exposed to sulfur mustard.

6.4 Furthermore, the FFM conducted a thorough technical weapon exploitation on a 217-mm calibre mortar that included a non-destructive evaluation and sampling of the contents at the SSRC in Barzi. Supported by the results of laboratory analysis, the FFM has determined that this mortar—which was handed over by the experts of the Russian Federation's CBRN Team to the authorities of the Syrian Arab Republic and reported to be connected to the described incident in Um-Housh on 16 September 2016—is a munition containing sulfur mustard.

7. FACT-FINDING MISSION MANDATED AIMS

7.1 To gather facts regarding the incident of alleged use of toxic chemicals as a weapon, as detailed in correspondence 259, dated 16 November 2016 and correspondence 9551, dated 29 November 2016 received from the Syrian Arab Republic, while remaining mindful that the mandate of the FFM does not envision the attribution of responsibility for the alleged use;

7.2 To examine, and if deemed necessary by the FFM team, collect samples that have been handed to the Government of the Syrian Arab Republic by the experts of the CBRN units of the Russian Armed Forces, which were reported to have been removed from the area of the 1070 housing district in the south-west of Aleppo city, and from the area of Maa'rata near the village of Um-Housh in a suburb of Aleppo;

7.3 To examine, and if deemed necessary by the FFM team, take the debris of the mortars that were handed over to the Government of the Syrian Arab Republic by the experts of the CBRN units of the Russian Armed Forces;

7.4 To examine, and if deemed necessary by the FFM team, collect samples from the one unexploded mortar that was handed over to the Government of the Syrian Arab Republic by the experts of the CBRN units of the Russian Armed Forces; and

7.5 Report to the Director-General upon conclusion of FFM activities.

8. OPERATIONAL INSTRUCTIONS

8.1 In order to meet the requirements of paragraph 7.1 above, the FFM team should perform, inter alia, the following activities:

8.2 Review and analyse all available information pertaining to the reported incident of the alleged use of toxic chemicals a weapon;

8.3 Collect testimonies from persons alleged to have been affected by the use of toxic chemicals as a weapon, including those who underwent treatment, eyewitnesses of the alleged use of toxic chemicals, treating medical personnel, and other persons who had treated or come into contact with persons who may have been affected by the alleged use of toxic chemicals, as detailed in correspondence 259, dated 16 November 2016 and correspondence 9551, dated 29 November 2016;

8.4 Examine and if possible, collect copies of hospital records, including patient registers, treatment records, and any other relevant records as deemed necessary;

8.5 Examine and if possible, collect copies of any other documentation and records deemed necessary; and

8.6 Take photographs and examine and, if possible, collect copies of video and telephone records.

8.7 In order to meet the requirements of paragraph 7.2 above, the FFM team should perform, inter alia, the following activities:

8.8 As the samples were not collected directly on-site by the FFM, the team shall record the handover of such samples and ensure that they are treated in accordance with the established procedures, including the chain of custody provisions on, as applicable;

8.9 As necessary, conduct an examination of samples using approved OPCW methods and equipment in order to make a preliminary identification of the chemical agent, and provide the Government of the Syrian Arab Republic with a duplicate or portion of each sample;

8.10 In order to meet the requirements of paragraph 7.2 above, the FFM team should perform, inter alia, the following activities;

8.11 As necessary, conduct the non-destructive evaluation of munitions alleged to have been used during incidents under investigation using approved OPCW methods in order to determine the internal configuration of the items prior to sampling activities;

8.12 If feasible, collect samples of the fill material to confirm the presence or absence of chemical agent fill in the munitions alleged to have been used during incidents under investigation, and provide the Government of the Syrian Arab Republic with a duplicate or portion of each sample;

8.13 Examine available evidence on the origin of the munitions, including historical evidence as available, and obtain additional information to support a determination of the origin of the items. This may include the identification of recognisable labels, markings, design features of the munitions, and review of on-site non-destructive evaluation measurements;

8.14 Should the munitions in question be confirmed as chemical weapons, discuss the modalities for their storage in the Syrian Arab Republic, rather than transporting the munitions to OPCW laboratory in the Netherlands; and

8.15 Collect information in order to determine whether a systematic verification in accordance with Part IV (A), paragraph 41 to 43 of the Verification Annex to the Convention is required.

9. SIGNATURE

This Fact-Finding Mission report was submitted in April 2017 in English.

[Signed]
Steven Wallis
Mission Leader

Annex 1

LIST OF CORRESPONDENCE WITH THE NATIONAL AUTHORITY OF THE SYRIAN ARAB REPUBLIC

Name	DCN	Date	Remarks
SAR NV 113	#0182081	29/11/2016	Information regarding chemical weapons
Letter to SAR. L/ODG/207468/16	NA	07/12/2016	Main body deployment
NV/ODG/206055/16	#6568 024	19/09/2016	Request to provide further information regarding the alleged incident on 16/09/16
NV/INS/OPB/208241/17	NA	02/02/2017	Request to provide further information regarding the alleged incidents including Um-Housh

Annex 2

LIST OF INFORMATION RECEIVED/HANDED OVER DURING DEPLOYMENTS FROM/TO THE AUTHORITES OF THE SYRIAN ARAB REPUBLIC

First Deployment				
No.	**DCM**	**Description**	**Date Received/Handed Over**	
1.	6666/027	List of samples held at SSRC in Barzi (Arabic)	15/12/2016	Received
2.	6666/029	SD card containing sampling photos	16/12/2016	Handed over
3.	6666/030	List of samples secured in SSRC in Barzi	17/12/2016	Handed over
4.	6666/031	List of seals on the WA	17/12/2016	Handed over
5.	6666/032	SD card with photos of Bio-medical samples	17/12/2016	Handed over
6.	6666/034	Report on the incident in Um-Housh – Russian Federation information provided by SAR NA	17/12/2016	Received
7.	6666/035	Document regarding used of HD by AOG in Um-Housh	17/12/2016	Received
8.	6666/040	List of seals applied on the blood samples	17/12/2016	Handed over
Second Deployment				
No.	**DCM**	**Description**	**Date Received/Handed Over**	
1.	6666/045	SD card containing the copies of samples recovery photos	10/01/2017	Handed over
2.	6666/041	List of seals on samples for off-site analysis	10/01/2017	Handed over
3.	6666/042	List of seals on joint custody samples	10/01/2017	Handed over
Post-deployment period				
1.	6666/050	Package of information regarding the incident in Um-Housh	20/01/2017	Received

Annex 3

LIST OF CORRESPONDENCE WITH THE NATIONAL AUTHORITY OF THE RUSSIAN FEDERATION

Name	DCN	Date	Info
NV/ODG/207153/16	NA	18/11/2016	The modality of taking custody of the samples – Um-Housh
NV/INS/208648/17	NA	23/01/2017	Request to provide the report on the samples and analysis related to the Um-Housh incident
Email communication	NA	14/02/2017	Notification for the date of the video conference with RF CBRN experts Um-Housh
NV/INS/208825/17	6666/061	07/03/2017	Request to provide more information about alleged incidents including Um-Housh
Data Laboratory Analysis	6666/070	30/03/2017	Data of sand and liquid samples analysis updated into OPCW Proficiency Testing format

Annex 4

DOCUMENTATION RECEIVED VIA EMAIL FROM RUSSIAN FEDERATION PERMANENT REPRESENTATION TO OPCW ON 02 MAR 2017

Serial	Item	Remarks
1.	Expert Conclusion	Copy received during initial FFM deployment
2.	Links to media-news	
3.	List of MOD Servicemen	
4.	Map co-ordinates – A3 format	See Annex 12.

Annex 5

LIST OF ITEMS RELATED TO THE TECHNICAL WEAPON EXPLOITATION AND LEFT IN SSRC BARZI

No	Tag Number	Description
1.	28679	Munition Fragment
2.	28552	Mortar, 217-mm calibre
3.	0106378	Drum – containing the mortar and the munition fragments

Annex 6

LIST OF SAMPLES TRASPORTED FOR OFF-SITE ANALYSIS

No.	New Sample Code	Description	Incident place
1.	01NAS	Neat Agent - RF	RF samples Um-Housh
2.	02NAS	Neat Agent - RF	
3.	03SLB	Soil blank - RF	
4.	04SLS	Soil sample - RF	
5.	05NAS	Neat Agent - RF	
6.	06SLB	Soil blank - RF	
7.	07SLS	Soil sample - RF	
8.	08SLS	Soil sample - RF	
9.	09SDS	Soil blank - RF	
17.	17WPS	Internal Swab from projectile shrapnel- SAR Um-Housh	SAR Um-Housh
18.	18SLS	Soil sample - SAR Um-Housh	
19.	19WPS	Swab from external wall of the house - SAR Um-Housh	
20.	20SLS	Soil sample - SAR Um-Housh	
21.	21WPS	Swab from projectile shrapnel Um-Housh	
22.	22SDS	Clothing from female casualty Um-Housh	
23.	23WPB	DCM solution used by SAR for wipes, swab and liquid samples	OPCW Blank
24.	24SDB	DCM blank for 14SDS 15 WPS and 21 WPS	
25.	30NAS	Neat agent from mortar diluted in DCM	RF Um-Housh
26.	30NAB	DCM blank for 30NAS	OPCW Blank

Annex 7

LIST OF SAMPLES LEFT IN JOINT CUSTODY IN SSRC IN BARZI

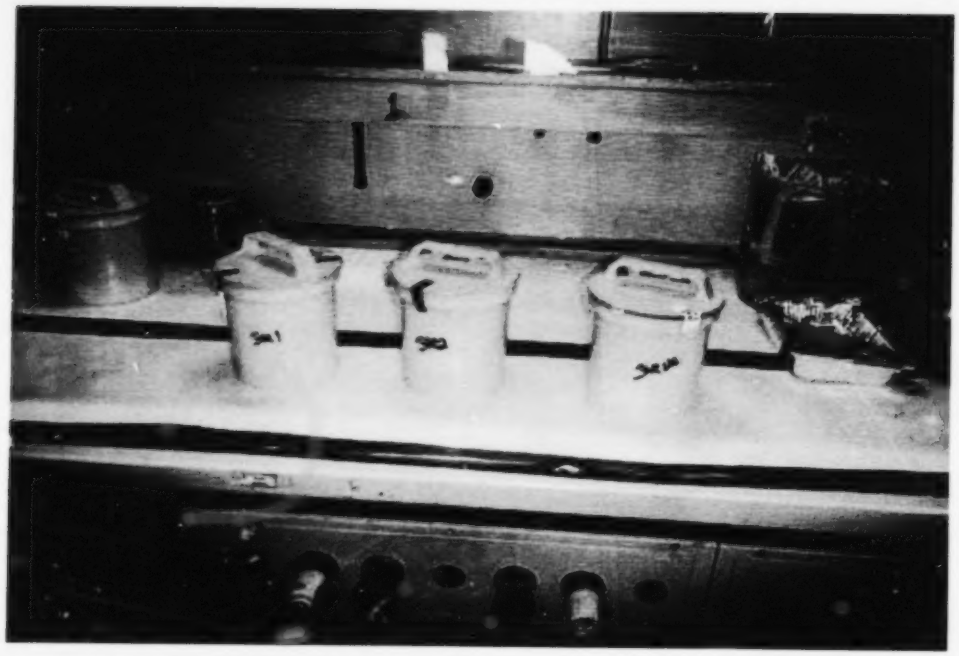
No.	New Sample Code	Description	Incident place
1.	01NAS	Neat Agent - RF	RF samples Um-Housh
2.	02NAS	Neat Agent - RF	
3.	03SLB	Soil blank - RF	
4.	04SLS	Soil sample - RF	
5.	05NAS	Neat Agent - RF	
6.	06SLB	Soil blank - RF	
7.	07SLS	Soil sample - RF	
8.	08SLS	Soil sample - RF	
9.	09SDS	Soil blank - RF	
10.	30NAS	Neat agent from mortar diluted in DCM	

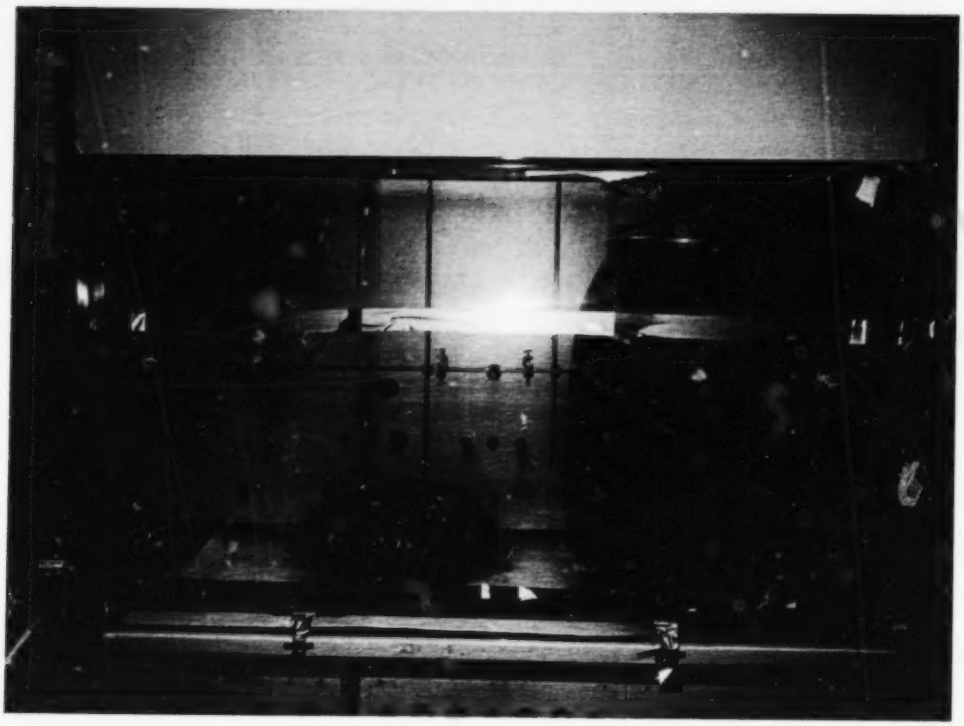
Annex 8

SELECT SAMPLE PHOTOGRAPHS

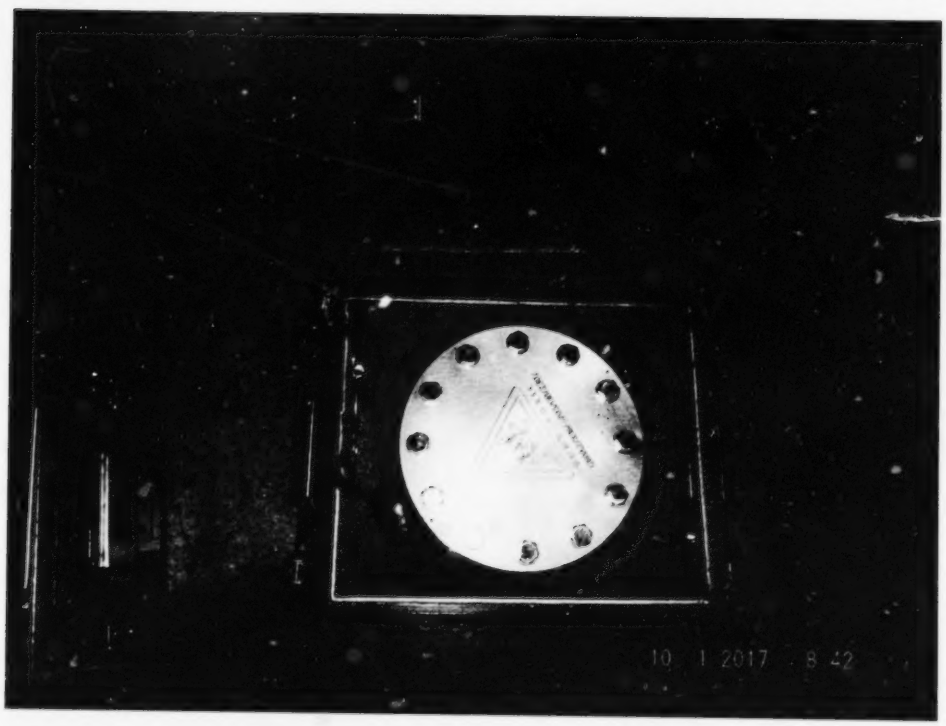
Samples received during first deployment

Post-packaging for storage

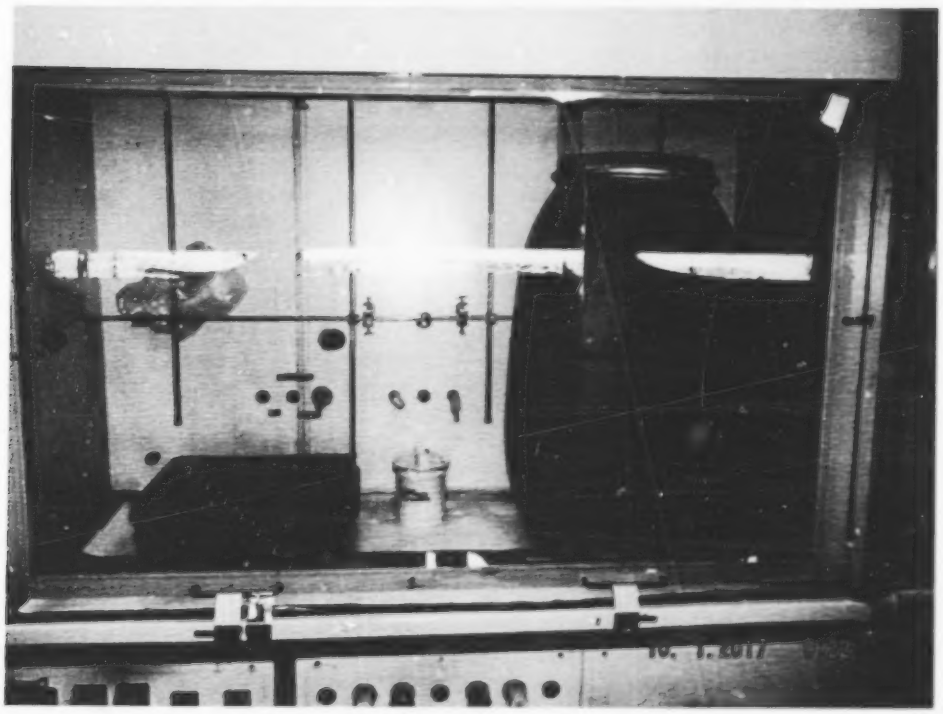




Samples repackaged for transportation during the second deployment



Samples and items in joint custody in SSRC in Barzi



Annex 9

TECHNICAL WEAPONS EXPLOITATION REPORT

Location: Barzi, Syria (SSRC – Institute 6000)
Date: 16.12.2016
Time: 12:35
Nomenclature/Munition ID: suspected CW Mortar
Country of Origin/Found: Recovered from Um-Housh, Syria (NNE Aleppo area)

Team Chain of Command:

1. FFM Team Leader
2. Technical Weapons Exploitation Team Leader

Personnel Make-Up of the Team:

1. Munitions Assessment/NDE Lead
2. Munitions Assessment/NDE
3. Analytical Chemist, Sampling
4. Health and Safety Specialist, Safety and Decontamination

Equipment:

1. **Measuring Tools:**
   a. Tape Measure
   b. Steel Callipers (inside & outside)
   c. Scale
2. **Assessment Equipment:**
   a. RTR-4N (with XRS-3 & XRS-4 X-ray Sources)
   b. Quantum UPE
   c. LCD 3.3
   d. Calid Paper
3. **Photography Equipment:**
   a. Digital Camera (2)
   b. Tripod
4. **Leak, Seal, and Packaging Equipment:**
   a. Plaster-of-Paris
   b. Large Plastic Bags

c. Duct Tape

d. Rags

5. Decontamination:

a. Shuffle Pit Tray

b. Buckets

c. BX-24

d. Fast Act

6. Other Equipment:

a. Sand Bags

b. Table

c. Tarpaulin (drop cloth)

d. Leather Gloves

e. Various Tools

Technical Data Checklist

1. Complete Round

a. Model: Unknown

b. Type: Mortar

c. Calibre: 217 mm

d. Condition: Fired but failed to function as designed

e. Overall Length (with fuse): No fuse present

f. Overall Weight: 24 kgs*

g. Fuse Model: No fuse present

h. Fuse Type: N/A

2. Projectile Model:

a. Overall Length (without fuse): 750 mm

b. Adapter Length (visible): No adapter present

c. Adapter Length (overall): N/A

* *Mortar still contained approximately 1 litre of suspected HD*

d. Ogive (Nose Cone) Length: 60 mm

e. Bourrelet Length: 100 mm

f. Number of Gas Checks: 3 (22 mm between gas check bands)

g. Body Length: 420 mm

h. Stabiliser Boom Length (visible):

   i. Total length with hex plug: 316 mm

   ii. Beginning of fins to body: 150 mm

i. Stabiliser Boom Length (overall): 330 mm

j. Hex Plug Diameter (Flat to Flat): 40 mm

k. Hex Plug Flats: 25 mm (width) x 10 mm (height)

l. Fin Length (along stabiliser boom): 160 mm

   i. Fin Length with Step: 95 mm

   ii. Fin Step: 10 mm

   iii. Angled Section of Fin Length: 90 mm

   iv. Fin Diameter: 3 mm

m. Number of Fins: 8

n. Diameter at Fuse Well:

   i. OD: 48 mm

   ii. ID: 40 mm

o. Fuse Well Thickness: 4 mm

p. Fuse Well Protrusion: 13 mm

q. Adapter Diameter (maximum): N/A

r. Adapter Thread Diameter: N/A

s. Gas Check Width: 5 mm

t. Body Diameter (maximum OD): 217 mm

u. Body Diameter (minimum OD): 112 mm

v. Wall Thickness: 6 – 8.3 mm

w. Stabiliser Boom Diameter (OD): 92 mm

x. Stabiliser Boom Diameter (ID): Not accessible (hex plug)

y. Stabiliser Boom Thread Diameter: N/A

z. Number of Gas Ports: No gas ports present

aa. Main Filler Cavity Depth: Same as entire projectile length minus the internal hex plug depth

bb. Ignition Cartridge Cavity Depth: No ignition cartridge present

cc. Number of Fuse Well Threads: 7

dd. Number of Adapter Threads: N/A

ee. Number of Stabiliser Boom Threads: N/A

ff. Adapter Weight: N/A

gg. Booster Charge Weight: No booster charge present

hh. Main Filler Weight: Mortar contained approximately 1 litre of suspected Mustard (HD)

ii. Adapter Material: N/A

jj. Booster Charge Material: N/A

kk. Projectile Material: Steel

ll. Main Filler Material: suspected Mustard (HD)

mm. Stabiliser Boom Material: Steel

nn. Fin Material: Steel

3. Ignition Cartridge

No Ignition charge present

4. Propellant Charge

No propellant charge present

5. Painting and Markings

a. Adapter Markings: N/A

b. Projectile Colour: Markings:

i. Unpainted

ii. No visible markings

iii. Entire mortar exhibited signs of corrosion

iv. Mortar body coated with thin rubberised material

v. Welds visible at front and aft section of mortar body

c. Fin Colour; Markings:

i. Unpainted

ii. No visible markings

d. Ignition Cartridge Colour; Markings: No ignition cartridge present

e. Primer Colour; Markings: No primer present

6. Additional Information

a. Nose Cone: The nose cone was heavily dented from impact. In addition, the thickness of the nose cone was much thinner than the rest of the mortar body.

b. Burster: X-ray analysis displayed the presence of an internal burster. Based on the RTR-4N software measurement tool, the measurements of the burster are as follows:

i. Diameter: ≈ 46 mm

ii. Length: ≈ 215 mm

Annex 10

REPORT ON THE ANALYSIS OF FFM SAMPLES RETURNED BY TEAM BRAVO

9 March 2017

Hugh Gregg, Head, OPCW Laboratory

Executive Summary

Biomedical samples returned by FFM team Bravo have been analysed by OPCW Designated Laboratories. Both laboratories have submitted their complete reports.

The following table summarises the findings.

FFM Sample ID	Anticoagulant	Patient	Sample ID	Remarks
P1	EDTA	A	P027	Evidence of sulfur mustard intoxication
P2	EDTA	B	P028	

Narrative

The FFM team Bravo collected 2 blood samples from victims of an alleged chemical attack, and these samples were returned to the OPCW Laboratory on Monday 19 December 2016.

The Director-General chose two OPCW Designated Laboratories for the analysis of the biomedical samples.

The OPCW Laboratory prepared two control samples for the biomedical samples – one positive (human plasma spiked with sulfur mustard, designated as P030) and one negative (human plasma, designated as P029). All of the samples were shipped to the selected Designated Laboratories on Wednesday 18 January 2017. The Designated Laboratory analytical reports were received on 2 and 7 February 2017.

All transfers of samples and materials were documented, and the chain of custody of all samples was maintained.

The OPCW Designated Laboratories were tasked as follows:

Scope of Analysis

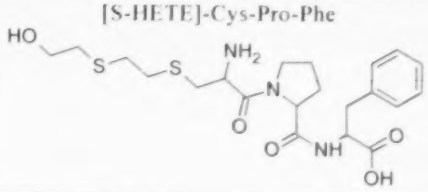
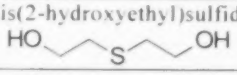
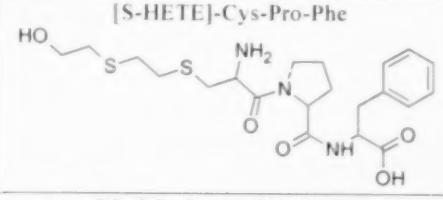
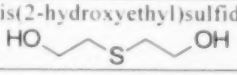
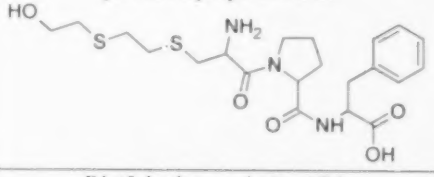
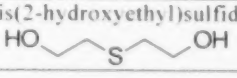
Please analyse these plasma samples for indicators of sulfur mustard exposure.

Results

The two laboratories analysing the biomedical samples both found adducts of sulfur mustard in samples P027, P028 and also the positive control sample P030, and found no adduct in the negative control, P029.

[2-[(2-Hydroxyethyl)thio]-ethyl]-Cys-Pro-Phe ([S-HETE]- Cys-Pro-Phe) is one of the expected protein adducts after intoxication with sulfur mustard. Likewise, the bis(2-hydroxyethyl)sulfide may be released from the mustard adducted protein.

The following table lists the detailed findings of each analysis.

Sample ID	Remarks	Chemical name & structure	Lab #2	Lab #3
P027	**Authentic sample**	[S-HETE]-Cys-Pro-Phe 	Positive	Positive
		Bis(2-hydroxyethyl)sulfide 	Positive	Positive
P028	**Authentic sample**	[S-HETE]-Cys-Pro-Phe 	Positive	Positive
		Bis(2-hydroxyethyl)sulfide 	Positive	Positive
P029	Negative control sample	No human plasma biomarker of sulfur mustard exposure was detected	Negative	Negative
P030	Positive control sample	[S-HETE]-Cys-Pro-Phe 	Positive	Positive
		Bis(2-hydroxyethyl)sulfide 	Positive	Positive

The presence of listed biomarkers indicates exposure to sulfur mustard.

Annex 11

REPORT ON THE ANALYSIS OF FFM SAMPLES RELATED TO THE UM-HOUSH INCIDENT RETURNED BY TEAM BRAVO

10 March 2017

Hugh Gregg, Head, OPCW Laboratory

Executive Summary

The environmental samples returned by FFM team Bravo have been analysed by the OPCW Laboratory. Additionally, the neat agent samples were also analysed by two OPCW Designated Laboratories.

The following table summarises the findings.

Incident place	No.	Sample Code	Description	Results
RF samples Um-Housh	1.	01NAS	Neat Agent	Mustard & related materials
	2.	02NAS	Neat Agent	
	3.	03SLB	Soil blank	No findings
	4.	04SLS	Soil sample	Mustard & related materials
	5.	05NAS	Neat Agent	
	6.	06SLB	Soil blank	No findings
	7.	07SLS	Soil sample	Mustard & related materials
	8.	08SLS	Soil sample	
	9.	09SDS	Soil blank	No findings
SAR Um-Housh	17.	17WPS	Internal Swab from projectile shrapnel	TNT, sulfur
	18.	18SLS	Soil sample	Mustard by-products
	19.	19WPS	Swab from external wall of the house	Mustard & related materials
	20.	20SLS	Soil sample	
	21.	21WPS	Swab from projectile shrapnel	Elemental sulfur
	22.	22SDS	Clothing from female casualty	Mustard by-products
OPCW Blank	23.	23WPB	DCM solution used by SAR for wipes, swab and liquid samples	No findings
	24.	24SDB	DCM blank for 14SDS 15 WPS and 21 WPS	No findings
RF Um-Housh	25.	30NAS	Neat agent from mortar diluted in DCM	Mustard & related materials
OPCW Blank	26.	30NAB	DCM blank for 30NAS	No findings

Narrative

The FFM team returned 26 environmental samples in connection with a number of incidents to the OPCW Laboratory on Friday 13 January 2017.

The Director-General chose two OPCW Designated Laboratories for the analysis of the 3 neat agent samples. All 26 environmental samples were analysed at the OPCW Laboratory.

The neat agent samples were shipped to the selected Designated Laboratories on Wednesday 18 January 2017. The Designated Laboratory reports were received on 2 and 6 February 2017.

All transfers of samples and materials were documented, and the chain of custody of all samples was maintained.

The OPCW Designated Laboratories were tasked as follows:

Scope of Analysis

Please analyse these samples and report the major scheduled chemical. Additionally, analyse the samples by GC/MS at high concentration (dilution of 1:1000); no report on this analysis is required.[1]

The OPCW Laboratory analysed 26 samples following our standard practices. All GC/MS data was analysed using AMDIS and OPCW and commercial databases.

Results

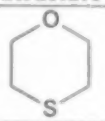
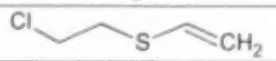
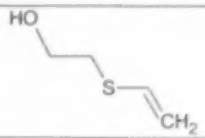
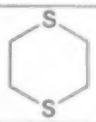
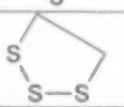
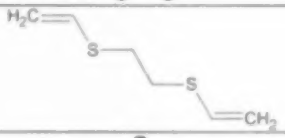
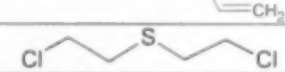
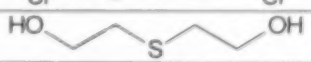
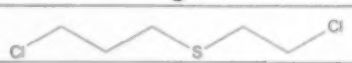
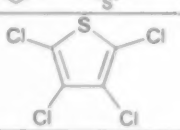
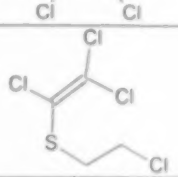
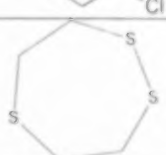
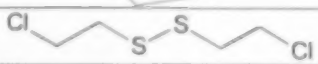
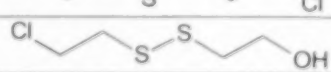
The two laboratories analysing the 3 neat agent samples identified the material as sulfur mustard. No control samples were sent with the neat agent samples.

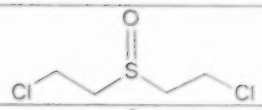
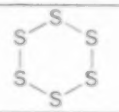
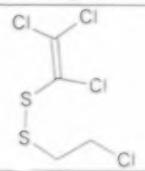
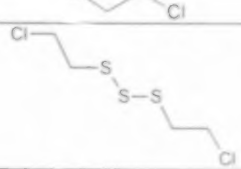
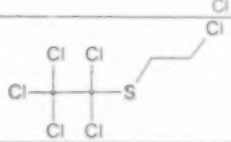
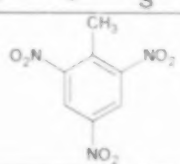
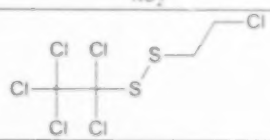
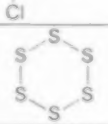
The OPCW Laboratory has analysed 26 environmental samples, and the results for 19 samples related to Um-Housh incident support the above identifications. Detailed information on compounds found in the organic fraction of the samples is presented in annex 1. Note in the annex that samples with no relevant chemicals identified are not listed.

The presence and relative quantities of the disulfide and trisulfide mustard analogs indicates this mustard was most likely produced using the Levinstein process. The presence of a number of chlorinated species indicates that an excess of sulfur monochloride (S_2Cl_2) was used.

[1] The laboratories were further asked to send their raw data on this analysis to the OPCW Laboratory.

Structures of relevant compounds found in the samples related to Um-Housh incident (see following table)

Name	Structure	Comment
1,4-Oxathiane		Not scheduled
2-Chloroethyl vinyl sulfide		Not scheduled
2-Hydroxyethyl vinyl sulfide		Not scheduled
1,4-Dithiane		Not scheduled
1,2,3-Trithiolane		Not scheduled
Ethane, 1,2-bis(vinylthio)-		Not scheduled
Bis(2-chloroethyl)sulfide		1.A.04
Bis(2-hydroxyethyl)sulfide		2.B.13
Propane, 1-chloro-3-((2-chloroethyl)thio)-		Not scheduled
Thiophene, tetrachloro-		Not scheduled
1,1,2-Trichloro-2-[(2-chloroethyl)thio]ethene		Not scheduled
1,2,5-Trithiepane		Not scheduled
Bis(2-chloroethyl)disulfide		Not scheduled
Ethanol, 2-[(2-chloroethyl)dithio]-		Not scheduled

Name	Structure	Comment
1-(2-Hydroxyethylthio)-2-(vinylthio)ethane		Not scheduled
Bis(2-chloroethyl)sulfoxide		Not scheduled
Hexathiane		Not scheduled
Disulfane, 1-(1,2,2-trichloroethenyl)-2-(2-chloroethyl)-		Not scheduled
Bis(2-chloroethyl)trisulfide		Not scheduled
Hexachlorosulfide2		Not scheduled
1,2-Bis(2-chloroethylthio)ethane		1.A.04
Trinitrotoluene		Not scheduled
Hexachlorodisulfide1		Not scheduled
Sulfur		Not scheduled
Bis[(2-chloroethyltyio)ethyl] sulfide		Not scheduled

[2] The structure of these two compounds is theoretical, they are not in any mass spec database

Summary of OPCW Laboratory results for Um-Housh samples[3]

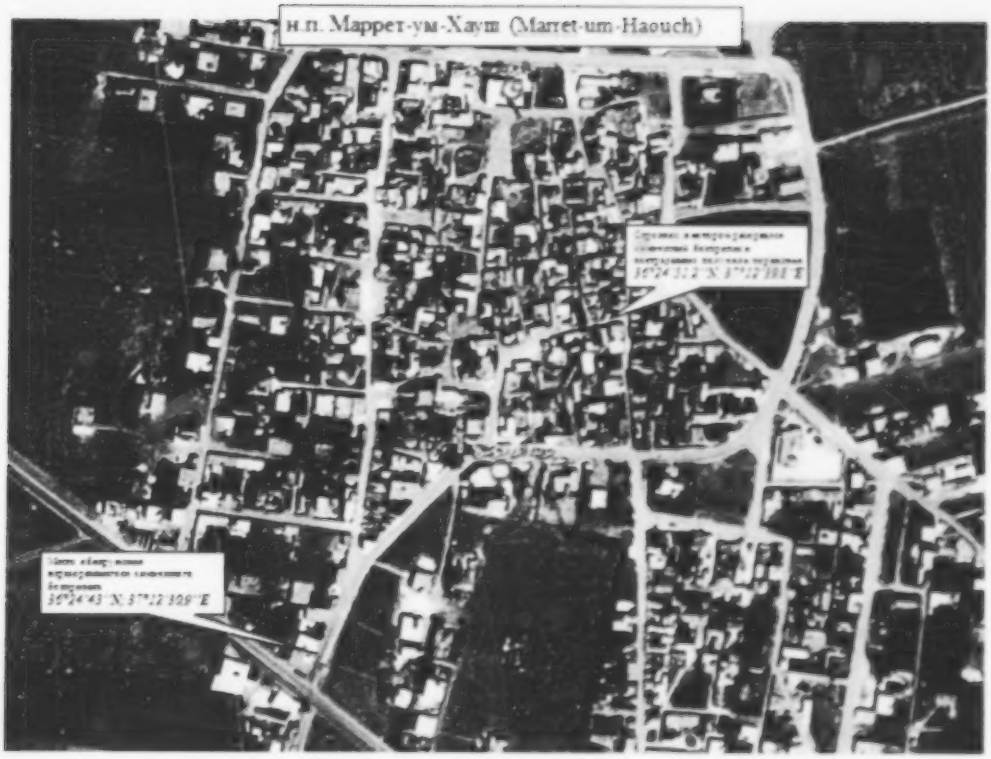
Name	01NAS	02NAS	04SLS	05NAS	07SLS	08SLS	17WPS	18SLS	19WPS	20SLS	21WPS	22SDS	30NAS
1,4-Oxathiane	0.03%	0.03%	0.01%	0.03%	0.03%								
2-Chloroethyl vinyl sulfide	0.06%	0.05%	0.30%	0.05%	0.12%	0.07%		0.01%		0.03%			
2-Hydroxyethyl vinyl sulfide			1.26%		1.67%	1.18%				0.07%			
1,4-Dithiane	0.60%	0.55%	0.12%	0.53%	0.30%	0.10%		0.01%	0.03%	0.01%			
1,2,3-Trithiolane	0.12%	0.13%	0.09%	0.13%	0.22%	0.10%		0.08%	0.09%	0.07%			
Ethane, 1,2-bis(vinylthio)-			0.09%		0.10%	0.06%							
Bis(2-chloroethyl)sulfide	36.50%	19.70%	0.23%	35.20%	0.43%	0.17%			0.05%	0.10%			4.04%
Bis(2-hydroxyethyl)sulfide			1.53%		4.32%	5.34%				0.24%			
Propane, 1-chloro-3-((2-chloroethyl)thio)-	0.01%	0.01%		0.01%									
Thiophene, tetrachloro-	0.19%	0.19%	0.15%	0.18%	0.09%	0.12%				0.00%			
1,1,2-Trichloro-2-[(2-chloroethyl)thio]ethene	3.50%	3.49%	3.80%	3.65%	4.91%	5.07%			0.05%	0.38%		0.02%	0.20%
1,2,5-Trithiepane	0.18%	0.19%	0.11%	0.21%	0.31%	0.06%		0.03%	0.02%	0.04%			
Bis(2-chloroethyl)disulfide	1.74%	1.74%	3.64%	1.81%	4.90%	4.47%		0.12%	0.12%	2.08%		0.01%	0.03%
Ethanol, 2-[(2-chloroethyl)dithio]-			0.09%		0.15%	0.07%							
1-(2-Hydroxyethylthio)-2-(vinylthio)ethane			0.18%		0.31%	0.26%							
Bis(2-chloroethyl)sulfoxide			0.04%		0.14%	0.09%				0.15%			
Hexathiane	0.02%	0.03%	1.90%	0.03%	2.58%	1.89%	0.44%	0.05%	1.36%	2.94%	0.11%		
Disulfane, 1-(1,2,2-trichloroethenyl)-2-(2-chloroethyl)-	0.06%	0.05%		0.06%						0.04%			
Bis(2-chloroethyl)trisulfide	0.90%	0.97%	3.73%	1.07%	4.42%	4.02%		0.77%	0.50%	5.35%			
Hexachlorosulfide	0.61%	0.74%	2.01%	0.80%	2.25%	2.20%			0.06%	0.69%		0.01%	
1,2-Bis(2-chloroethylthio)ethane	3.77%	4.20%	0.13%	4.33%	0.19%								0.15%
Trinitrotoluene	0.42%	0.46%	0.67%	0.50%	0.74%	0.79%	0.05%						
Hexachlorodisulfide	1.99%	2.15%		2.33%									
Sulfur	0.21%	0.30%	1.12%	0.25%	4.09%	3.35%	1.93%	0.33%	22.50%	1.06%	2.22%		
Bis[(2-chloroethyltyio)ethyl] sulfide	0.05%	0.05%	0.39%	0.05%	0.13%	0.15%							

[3] Percentages listed are relative amounts as given by AMDIS.

Annex 12

MAPPING OF INCIDENT LOCATION

Map 1. Incident site.



Map 2. Incident site as provided by the Russian Federation.

Annex 13

LIST OF MATERIAL GATHERED DURING THE INTERVIEW PROCESS

Entry	ERN	DCN	Interviewee Name / Code	Evidence Description	Evidence Collected/Received	
					When (Date and Time)	Where
1.	201612131005301	10053	10053	1 x MSD Audio recording	17/12/2016 14:40	Damascus
2.	201612131005302	10053	10053	1 x MSD Audio recording	17/12/2016 14:40	Damascus
3.	201612131005303	10053	10053	1 x SD photos	17/12/2016 14:40	Damascus
4.	201612131005304	10053	10053	1 x SD photos	17/12/2016 14:40	Damascus